

CLAIMS

1. A process for producing titania-silica mixed crystal particles having a high bulk density and comprising titanium oxide as the main component and silicon oxide as a subsidiary component, the process comprising decomposing gaseous titanium halide and gaseous silicon halide each heated at 600°C or more in the presence of oxygen or water vapor heated at 600°C or more to obtain a powder comprising titanium oxide and silicon oxide, heating the obtained powder at 300 to 600°C to decrease the concentration of raw material-originated hydrogen halide in the powder to 1 mass% or less, and then subjecting the powder to a treatment of dissociating the aggregated or steric structure.
2. The process as described in claim 1, wherein in the step of said decomposition, the gaseous metal halide and an oxidizing gas are introduced into a reactor at a flow rate of 30 m/sec or more.
3. The process as described in claim 2, wherein the gaseous metal halide and the oxidizing gas have an average flow rate of 5 m/sec or more in the reactor.
4. The process as described in claim 2, wherein the gaseous metal halide and the oxidizing gas have a residence time at a temperature of 600°C or more in the reactor is 1 second or less.
5. The process for producing a titania-silica mixed crystal particle having a high bulk density as described in any one of claims 1 to 4, wherein the treatment of dissociating the aggregated or steric structure is a stirring treatment of charging the powder into a vessel having a plurality of rotary blades differing in the shape and rotating the rotary blades at a peripheral speed of 4 to 60 m/s.
6. The process according to claim 5, wherein the dissociating treatment of the powder is conducted by a Henschel mixer.
7. Titania-silica mixed crystal particles produced

by the production process described in any one of claims 1 to 6, which has a BET specific surface area of 10 to 200 m²/g and a bulk density of 0.15 g/cm³ to less than 0.8 g/cm³.

5 8. Titania-silica mixed crystal particles produced by a gas phase process, which has a BET specific surface area of 20 to 100 m²/g and a bulk density of 0.2 g/cm³ to less than 0.6 g/cm³.

10 9. Titania-silica mixed crystal particles produced by a gas phase process, which has a BET specific surface area of 30 to 70 m²/g and a bulk density or 0.2 g/cm³ to less than 0.5 g/cm³.

15 10. The titania-silica mixed crystal particles as described in any one of claims 7 to 9, wherein SiO₂ is contained in an amount of 0.1 mass% to less than 50 mass%.

11. The titania-silica mixed crystal particles as described in any one of claims 7 to 9, wherein SiO₂ is contained in an amount of 10 to 40 mass%.

20 12. The titania-silica mixed crystal particles as described in any one of claims 7 to 9, wherein SiO₂ is contained in an amount of 15 to 30 mass%.

25 13. The titania-silica mixed crystal particles as described in any one of claims 7 to 12, wherein the oil absorption amount is less than 1 ml/g as measured by the oil absorption measuring method of JIS K 5101 using squalane in place of linseed oil.

30 14. A cosmetic material comprising the titania-silica mixed crystal particles described in any one of claims 7 to 13.

35 15. The cosmetic material as described in claim 14, further comprising an additive selected from the group consisting of oils, whitening agents, moisturizers, anti-aging agents, emollients, essences, antiinflammatories, antioxidants, surfactants, chelating agents, antibiotics, antiseptics, amino acids, sugars, organic acids, alcohols, esters, fats and oils, hydrocarbons,

ultraviolet inhibitors and inorganic powders.

16. An organic polymer composition comprising an organic polymer and the titania-silica mixed crystal particles described in any one of claim 7 to 13, the
5 titania-silica mixed crystal particles being contained in an amount of 0.01 to 80 mass% based on the total mass of the composition.

17. The organic polymer composition as described in claim 16, wherein the organic polymer of the organic
10 polymer composition is at least one resin selected from the group consisting of synthetic thermoplastic resins, synthetic thermosetting resins and natural resins.

18. A silicon polymer composition comprising a silicon polymer and the titania-silica mixed crystal
15 particles described in any one of claims 7 to 13, the titania-silica mixed crystal particles being contained in an amount of 0.01 to 90 mass% based on the total mass of the composition.

19. The organic polymer composition or silicon
20 polymer composition as described in any one of claims 15 to 18, wherein the organic polymer composition or silicon polymer composition is a compound.

20. The organic polymer composition or silicon
25 polymer composition as described in any one of claims 15 to 18, wherein the organic polymer composition or silicon polymer composition is a masterbatch.

21. A molded article obtained by molding the organic polymer composition or silicon polymer
30 composition described in any one of claims 15 to 20.

22. The molded article as described in claim 21, wherein the molded article is one selected from the group of fiber, film and plastic molded article.

23. A slurry comprising the titania-silica mixed crystal particle described in any one of claims 7 to 13.

35 24. A dye-sensitized solar cell comprising the titania-silica mixed crystal particles described in any one of claims 7 to 13 in the structure.

25. A coating agent comprising the titania-silica mixed crystal particles described in any one of claims 7 to 13 in water or an organic solvent and optionally a binder.

5 26. A coating material comprising the titania-silica mixed crystal particle described in any one of claims 7 to 13 in water or an organic solvent and optionally a binder.

10 27. A structure having on the surface thereof the titania-silica mixed crystal particle described in any one of claims 7 to 13.

15 28. The structure as described in claim 27, which is selected from the group consisting of building materials, machines, vehicles, glass products, home electric appliances, agricultural materials, electronic equipment, tools, tableware, bath furnishings, toilet goods, furniture, clothing, cloth products, fibers, leather products, paper products, sporting goods, bedding, containers, spectacles, billboards, piping, wiring, metal fittings, hygiene materials, automobile equipment, outdoor products such as tents, stockings, socks, gloves and masks.

20 29. A photocatalyst which is the titania-silica mixed crystal particle described in any one of claims 7 to 13.

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